

ADVANCEMENT IN ENVIRONMENTAL TECHNOLOGY:

THE “H” POWER

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Abstract

Hydrogen fuel cell usage has been seen as a great approach as a pollution-free alternative to using fossil fuels which makes water by combining hydrogen and oxygen. In this way, they generate electricity. There is a problem with fuel cells for obtaining hydrogen. Molecules like water and alcohol have to be processed to extract hydrogen to feed into a fuel cell. Some of these processes require using other energy sources, which then defeat the advantages of this "clean" fuel. Scientists have come up with ways to make power laptops and few small devices with fuel cells as an advancement in technology, and some car companies are promising that soon they will be seeing cars that emit nothing but clean water. H power is renowned for the highest level of quality, innovation, and design. For twenty years H power has created glorious motorcycles, known for their excellent performance and unrivaled engineering. This paper results in a comprehensive survey to know the role played by hydrogen in the provision of electricity, heat, industry, transport and energy storage in a low-carbon energy system, and helps in the assessment of the status of hydrogen.

Keywords: Hydrogen fuel cell; Fossil fuels; Technology; Innovation; Engineering.

Introduction

France is rising as a rustic with ambitions to be a chemical element powerhouse in Europe. In June 2018, the French Environmental Minister, Nicolas Hulot, proclaimed a one hundred million monetary unit investment into the French chemical element economy. The investment was pledged to be spent in 2019 alone and probably annually for years once. Currently, France has solely 260 hydrogen fuel cell vehicles within the country; but, the government's arrange is to possess 5200 chemical element powered vehicles (primarily business and serious duty vehicles) by 2023.

Countries like France, Norway, and Germany have created huge strides to develop and deploy element fuel cells in an exceedingly type of applications. For infrastructure, the goal is to possess one hundred chemical element supply stations 2023 compared to the 20 that exist nowadays. France's strategy for cell vehicle roll out is with captive fleets, targeting the communication and courier service companies using Renault Kangoos.



Figure 1 Renault Kangoo ZE H2 by Symbio FCell in France

Whether hydrogen will be renewable remains comparatively unreciprocated because the government has solely set a target of 10% renewable element by 2023 and 40% by 2028. The French Association for element and Fuel Cells (AFHYPAC) sees this as a step within the right direction of realizing a hydrogen economy in France. Last year the Zero Emission depression Project was declared for the Auvergne Rhone River Alpes region funded by the European Union to support the launch of 1,000 FCEVs, 20 renewable element provision stations, and 15 electrolyzers. The project received funding of 70 million euros over consecutive ten years.

The first cell ferry is scheduled to be operative by 2021. The most important hurdle for fuel cells in maritime vessels is that the lack of rules. Codes and standards for any technology put in on a ship or vessel of any size is regulated by the International Maritime Organization (IMO).

Currently there's no literature on the utilization of element as a fuel in an exceedingly maritime application. To help during this method, the Norwegian Maritime Authority is developing rules supported the cell ferry scheduled to be free in 2021. The hope is that these codes and standards are incorporated into the IMO code. The method for adding to the IMO code is on a four year cycle with consecutive chance to approve such additions in 2021.



Figure 2 Concept drawing of fuel cell ferry in Norway

The biggest news of out of European nation is that the use of electric cell locomotives developed by Hydrogenises and French train manufacturer Alstom.

The trains are going to move passengers regionally as a part of the German rail network. Hydrogenics explicit it will assist in building 40 fuel cell trains by 2020 for the European nation and therefore the United Kingdom. So far Alstom has completed the primary operational tests of its Coradia iLint fuel cell train.



Figure 3 Alstom fuel cell passenger train in Germany

H - Power in India

The Ministry has supported analysis, development and demonstration comes on numerous aspects of H energy as well as its production, storage and use as a fuel for generation of mechanical/thermal/electrical energy. The application of Hydrogen in fuel cells for power generation has been incontestable as a results of initiatives taken by Ministry. Hydrogen fuelled tiny power generating sets, 2 wheeler (motor cycles), 3 wheeler and chemical process combustion system for residential and industrial sectors and cell buses have conjointly being developed and incontestable.



Figure 4 Biological Hydrogen Production Plant set up by MCRC, Chennai



Figure 5 Hydrogen fuelled 3-wheeler developed jointly by IIT Delhi and Mahindra & Mahindra

Objectives:

- Demonstration projects relating to production, storage and applications of hydrogen
- Feasibility of production of hydrogen by various processes/technologies, especially based on renewable energy methods can be studied and evaluated.
- Projects on utilization of hydrogen as a fuel for stationary, automobile and portable applications can be supported.
- Projects for development of hydrogen infrastructure in public-private participation made for production, storage and applications of hydrogen, including safety, standards and codes, capacity building & public awareness can also be supported.

Organizations working in hydrogen energy area: Hydrogen Production

- Banaras Hindu University (BHU), Varanasi
- Indian Institutes of Technology, Kharagpur
- Jawaharlal Nehru Technological University (JNTU), Hyderabad.
- Indian Institute of Chemical Technology (IICT), Hyderabad.
- R&D Centre, Indian Oil Corporation Ltd. (IOCL), Faridabad

Hydrogen Storage

- Banaras Hindu University (BHU), Varansi
- Indian Institutes of Technology, Chennai/Guwahati.
- National Environmental Engineering Research Institute (NEERI), Nagpur
- National Institute of Technology (NIT), Tiruchirapalli

Achievements:

- National Hydrogen Energy Programme envisages to be implemented in Public-Private partnership mode.
- Environmentally benign processes/technologies for the production of hydrogen developed and demonstrated.
- Materials/alloys/methods developed for storage of hydrogen as metal hydrides.
- Hydrogen – Compressed Natural Gas (H-CNG) dispensing station set up in New Delhi.

It is high time that private sector participation in the power sector should always be given due importance. The main problem of the power sector in the Republic of India has been the gap between demand and supply. This gap has been increasing because of the increase in the consumption of power. H-power had been the foremost popular source of power development within the initial three plans that accorded high priority for developments. The general public sector alone won't be able to raise ample resources to speculate on new power generation projects comes for meeting the rapidly growing demand of this in the coming years. Therefore, considerable emphasis could also be given to non-public investments for power development, Private sector investment might bridge the deficit within the resources for extra power capacity.

References

- Air Products and Chemicals. 2003. Information available online at <http://www.airproducts.com/Products/LiquidBulkGases/HydrogenEnergyFuelCells/FrequentlyAskedQuestions.htm>. Accessed December 10, 2003.
- Arthur D. Little, Inc. 2001. *Guidance for Transportation Technologies: Fuel Choice for Fuel Cell Vehicles: Phase Two Final Report to DOE*. Cambridge, Mass.: Arthur D. Little.
- Bak, P.E. 2003. "Daimler Chrysler Minivan, Powered by Unique Fuel-Cell System, to Be Featured in Pentagon Display," April 20. Available online at http://www.h2cars.biz/artman/publish/article_144.shtml. Accessed December 10, 2003.
- DiPietro, P. 1997. "Incorporating Carbon Dioxide Sequestration into Hydrogen Energy Systems." In *Proceedings of the 1997 DOE Hydrogen Program Review*, Vol. II. Golden, Colo., National Renewable Energy Laboratory.
- DOE. 2002a. *National Hydrogen Energy Roadmap*. Washington, D.C.: U.S. Department of Energy, November.
- DOE. 2003e. *Basic Research Needs for the Hydrogen Economy: Report of the Basic Energy Sciences Workshop on Hydrogen Production Storage and Use*. Washington, D.C.: U.S. Department of Energy.
- Holt, N. 2003. "Hydrogen Production Options." Paper presented at Hydrogen-Electric Economy Workshop, Electric Power Research Institute, Palo Alto, Calif., July 17–18.
- Johansson, T.B. 1993. *Renewable Energy-Sources for Fuels and Electricity*. Washington, D.C.: Island Press.
- Reeves, A. 2003. "Wind Electricity for Electric Power." A Renewable Energy Policy Project Issue Brief (REPP), July. Available online at http://www.repp.org/articles/static/1/binaries/wind%20issue%20brief_FINAL.pdf. Accessed December 9, 2003.
- Schrattenholzer, L. 1998. "Energy Demand and Supply, 1900–2100." RR-98-4. International Institute for Applied Systems Analysis, Laxenburg, Austria. Reprinted from *Science Vision*, Vol. 3, No. 1, pp. 39–57.
- Turner, J.A. 1999. "A Realizable Renewable Energy Future." *Science*. Vol. 285, pp. 687–689, July 30.
- Yildiz, B., and M. Kazimi. 2003. *Nuclear Options for Hydrogen and Hydrogen-Based Liquid Fuels Production*. MIT-NES-TR-001. Center for Advanced Nuclear Energy Systems, Cambridge, Mass.: Massachusetts Institute of Technology.